

REMARKS

This Amendment is made in response to the Office Action mailed December 2, 2004. In the Office Action, the Examiner:

- imposed a restriction/election requirement and rendered claims 26-31 withdrawn;
- requested that applicant notes the disposition of parent application serial numbers and that serial number 09/390,142 is not mentioned in the specification
- objected to the disclosure because of some informalities;
- rejected claims 23-25 under 35 U.S.C. 102(e) as being anticipated by Zuniga et al (2002/0086624);
- allowed claims 1, and 9-16.

In this amendment, the specification has been amended to reference the parent application serial number 09/390,142 and to correct the informalities objected to by the Examiner. In addition, claims 1, 9-16, and 23-26 have been amended. New claims 32 and 23 are added. Support for the newly added claims 32 and 33 can be found in the paragraph starting at line 18 on page 24 of the specification and FIGS. 8 and 9.

Applicants believed in good faith that previously presented claims 26-31 were directed to the same inventions as claimed in claims 1 and 9-16 and not to a non-elected invention. Claims 9 and 16 as amended both include the element that the first and second pressurized fluids are adjusted to achieve a predetermined polishing pressure profile over a front side surface of a workpiece. Therefore, claim 26 as amended and claims 27-31 are directed to the same invention as claim 9 or 16 as amended. Therefore, claim 26 as amended and claims 27-31 should not be subjected to the restriction requirement and be rendered withdrawn by the Office Action.

The amendments to claims 1 and 9-16 are for the most literal changes for clarity. Therefore, claims 1 and 9-16 as amended should still be allowed.

Claim 23 as amended recites:

A substrate planarization machine comprising:
a floating retaining ring; and
a diaphragm which mounts said a substrate and is supported by
said floating retaining ring,
wherein said floating retaining ring retains said substrate to said

diaphragm during planarization against a polishing pad.

The substrate planarization machine according to claim 23 as amended comprises a diaphragm that mounts a substrate and that is supported by a floating retaining ring. Having the diaphragm that mounts the substrate supported by the floating retaining ring generates the advantages that a vertical motion of the floating retaining ring can be made smooth and that the substrate is pressed uniformly across the entire surface of the substrate, particularly near an edge of the substrate, when the diaphragm is pressed by a fluid pressure. Therefore, the polishing uniformity of the substrate across the entire surface of the substrate can be improved.

In contrast, Zuniga (US2002/0086624A1) discloses a carrier head including a base 104, a support structure 114 connected to the base by a flexure 116, a flexible membrane 118 connected to the support structure 114 and extending below support structure 114 to provide a mounting surface 274 for the substrate, and a retaining ring 110 secured at an outer edge of the base 104 (page 4, section [0061]; and page 6, section [0081]). As shown in FIGS. 4, 6, 7, 8, 9, 10, 13, and 14, and described in section 85 on page 6 and in section 86 on page 7 of Zuniga, support structure 114 includes a support ring 250 and an annular lower clamp 280, and a portion 272 of membrane 118 wraps around a lower corner of support ring 250 with the edge 270 of membrane 118 being clamped between lower clamp 280 and support ring 250. Thus, the flexible membrane 118 in Zuniga is connected to the support structure 114, and is not supported by the retaining ring 110.

Therefore, claim 23 as amended and claim 25 as amended are patentable over Zuniga.

Claim 24 as amended and new claim 32 depend from claim 23 as amended and include further limitations in addition to the limitations in claim 23 as amended. Therefore, claim 24 as amended and new claim 32 are patentable for at least the same reasons claim 23 as amended is patentable.

Claim 25 as amended recites:

A substrate processing machine comprising:
a floating retaining ring; and
an open diaphragm which mounts a substrate and is supported by
said floating retaining ring,
wherein said open diaphragm presses said substrate against a
material removal tool during processing while said floating retaining ring retains

said substrate to said open diaphragm.

The argument regarding claim 23 as amended applies to claim 25 as amended. In addition, claim 25 is patentable over Zuniga for the further reason that the diaphragm in claim 25 is an open diaphragm that is not found in Zuniga. Therefore, claim 25 is patentable over Zuniga.

New claim 33 depends from claim 25 as amended and includes further limitations in addition to the limitations in claim 25 as amended. Therefore, new claim 33 is patentable for at least the same reasons claim 25 as amended is patentable.

Claim 26 as amended recites:

In a polishing head, a method for holding and polishing a semiconductor wafer on a polishing pad, said method comprising:

laterally restraining movement of said wafer with a retaining ring having an interior cylindrical surface and defining an interior cylindrical pocket sized to fit said wafer when said wafer is moved relative to said polishing pad while being polished against said polishing pad, said retaining ring being attached to a wafer subcarrier by a primary diaphragm and to a housing of said polishing head by a secondary diaphragm;

carrying said wafer with said wafer subcarrier during polishing;

maintaining a non-contacting separation between a first surface of a wafer stop plate and a wafer back side surface during polishing of said wafer and adjusting a first pressurized pneumatic fluid and a second pressurized pneumatic fluid to achieve a predetermined polishing pressure profile over a front side surface of said wafer;

whereina resilient pneumatic annular sealing bladder is coupled for fluid communication to the first pressurized pneumatic fluid to define a first pneumatic zone and attached to said first surface of said wafer stop plate adjacent said retaining ring interior cylindrical surface to receive said wafer and to support said wafer at a peripheral edge;

wherein said resilient pneumatic annular sealing bladder defines a second pneumatic zone radially interior to said first pneumatic zone and extends between said first surface of said wafer stop plate and said wafer when said wafer is attached to said polishing head during a polishing operation and is coupled for fluid communication to the second pressurized pneumatic fluid; and

wherein said wafer stop plate operative during non-polishing periods to prevent said wafer from flexing excessively from an applied vacuum force used to hold said wafer to said polishing head during a wafer loading and a wafer unloading operation.


To practice the method recited in claim 26 as amended requires an apparatus having all of the elements recited in amended claim 1. Therefore, the restriction requirement with respect to claim 26 and its dependent claim 27 should be withdraw.

Also, to practice the method recited in claim 28 requires an apparatus having all of the elements recited in amended claim 9. Therefore, the restriction requirement with respect to claim 28 and its dependent claims 29-31 should be withdrawn.

Prompt and favorable consideration of this Amendment and Response is respectfully requested. If the Examiner believes, for any reason, that personal communication will expedite prosecution of the application, the Examiner is invited to call the undersigned at (650) 494-8700.

No fee is believed to be due. But the Commissioner is hereby authorized to charge any additional fees which may be required by this Response to Office Action including fees for added claims not otherwise paid for, or to credit any overpayment, to Deposit Account No. 50-2319 (No. A-68359-1/RMA/JJZ (475852-7)).

RESPECTFULLY SUBMITTED,

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